Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.6, No.10, 2015

The Influence of Capital Market Deepening on Mortgage Market Growth in Kenya

Ariemba Jared Mogaka[1]* Kiweu Josephat Mboya[2] Riro George Kamau[3]
1.School of Business and Economics, South Eastern Kenya University
2.School of Management and Commerce, Strathmore University
3.School of Business Management and Economics, Dedan Kimathi University of Technology
*E-mail of the corresponding author: jared.ariemba@gmail.com

Abstract
This study examined the influence of capital markets deepening on mortgage growth in Kenya. The indicators used for capital market deepening were Ratio of Equity Market Capitalization to GDP; the Bond Market Turnover Ratio; Pension Assets; Insurance Assets and the Ratio of Private Credit to GDP while the growth of the mortgage market is measured by the total lending by the banking sector for mortgages. Data was collected for the variables for the 30 year period starting 1984 to 2013. Stepwise regression was used in the analysis because of multicollinearity among some of the variables. As a result, bond market turnover ratio and ratio of private credit to GDP were excluded from the analysis. Insurance assets and pension assets were found to have the greatest influence on mortgage growth while equity market capitalization to GDP has a negative influence.
Keywords: Mortgage Market, Capital Markets, Equity Market, Bond Market, Insurance Assets, Pension Assets, Capitalization.

Introduction and Motivation

According to King and Levine (1993), capital markets are created to provide avenues for effective mobilization of funds from surplus economic units and channelling those funds to deficit units for long-term investment purposes. Through the capital markets, investors are able to diversify their financial assets portfolio and firms have an opportunity to diversify sourcing for finance. According to King and Levine (1993) and Dahou, Ismael and Pfister (2009), a developed capital market is characterized by high volumes of trading of a variety of long term debt and equity instruments. Jaffe and Renaud, (1996) argues that access to long term finance is fundamental for the mortgage market because mortgage lenders lend long term. Therefore, mortgage lenders need to access long term finance if a nation is to build a sustainable mortgage market.

According to Walley et al., (2013), growth of mortgage markets depend on long-term funding sources, which are not easily available through retail deposits. These normally come from non-banking financial institutions such as insurance companies and pension funds and through financial markets. Jaffe and Renaud, (1996) further argue that if lenders rely on short-term deposits to lend long term, they face a liquidity risk due to the mismatch between long-term mortgage loans and short-term deposits. Jaffe and Renaud, (1996) argue that mortgage loans have long term maturities and do not easily trade in secondary markets. Liquidity problems in the mortgage market may lead to fire sales as the concerned lenders face bankruptcy.

Lea, et al. (2004) argues that capital markets can provide an attractive and potentially large source of long-term funding for housing. Pension and insurance institutions have large pools of funds that can be accessed with the right mortgage securities for the purpose of financing housing. The creation of mortgage-related securities can provide instruments by which housing finance providers can access these important sources of funds and better manage and allocate part of their risks.

To tap into the accumulated savings in an economy, the capital market needs to develop the right mortgage securities. Chiquier and Lea, (2009) assert that there are two fundamental systems of housing finance; one system is based on the mobilization of deposits directly from the public and the other is based on indirect mobilization of financial resources through the sale of debentures of various maturities to the capital market. The building society or savings and loans system of housing finance in the U.S. is a typical example of the former. This system has been used as a model in many other countries as well.

Chiquer et al., (2004) asserts that mortgage market securitization increases the availability of funds for the borrowers in the mortgage lending system and decreases some of the risks of financial institutions. He introduces two prerequisites for successful securitization in developing countries; first, is government support to develop the proper legal and regulatory infrastructure for mortgage security issuance in emerging markets and second, is the market demand for mortgage securities from the financial institutions.

In Kenya the institutions that lend money for real estate projects include: banks, specialized mortgage firms, saving and loans firms, insurance companies, government parastatals, pension funds, trusts and other real investment institutions as noted by Lwali (2008). According to the Central Bank of Kenya, CBK (2013), commercial banks dominate mortgage lending in Kenya. There are 43 banks and one Mortgage Finance Company in the Kenyan banking system, 36 of them having mortgage portfolios of differing sizes. Central Bank

of Kenya authorizes two types of lenders, the ordinary banks and the mortgage companies. Similar regulations with regards to mortgage financing apply to the two types of lenders.

This study is conducted to examine the influence of the development of the capital markets on the growth of the mortgage market in Kenya. So far, no time series study has been conducted to examine the influence of the different aspects of the capital markets on the growth of the mortgage market. Some of the indicators of development of the capital markets include the liquidity of the stock market, the private and public bond market capitalization, the stock and bond market turnover ratios, the ratios of public and private bond markets capitalization to GDP among others (Applegarth, 2004).

A CBK (2011) survey estimates the potential of the mortgage market in Kenya at KES 800 billion. However, the actual outstanding residential mortgage loans stood at KES 61.4 billion. This represents a slack of 93.5% in the development of the mortgage market. This has been reflected in the annual shortage of production and consumption of housing which stands at 150,000 units annually. Levine (1997) asserts that provision of housing will only be successful if the housing finance system is closer to the mortgage end of the spectrum than the incremental building model normally adopted by many developing countries.

In its annual surveys, the CBK (2011), CBK (2012) and CBK (2013) has been has been measuring the growth of Kenya's mortgage market in terms of total mortgage lending, number of mortgage accounts and the ratio of mortgage debt to GDP. Walley et al., (2013), Femi (2013), Warnock and Warnock (2008) among others have also measured the development of the mortgage market in terms of the ratio of outstanding residential mortgage debt to GDP, the total mortgage lending and the number of mortgage accounts.

The remainder of this paper is organized as follows: Section two presents a review of related literature and the research hypotheses. The research method adopted is outlined in section three while section five presents the results followed by a summary, discussions and conclusions in the final section

Literature Review and Hypothesis

The main theory underlying this study is the theory of financial. According to Allen and Santomero (1997), the theory of financial intermediation is based on the concept of transaction cost and information asymmetry. It argues that financial intermediaries exist to channel funds between surplus and deficit agents. Wensveen (2003) argues that even with deregulation, globalization, deepening of financial markets and information technology, all which have led to reduction in information asymmetry and transaction costs, the theory of financial intermediation considers intermediation a value adding process. Warnock and Warnock (2008) argue that the efficiency of the intermediation process i.e. obtaining information concerning borrowers, writing debt contracts and enforcing them will vary from one contracting jurisdiction to another due to differences in the legal regime.
Dinsmore (1998) argues that the public capital markets are playing an increasingly significant role in financing the ownership and development of commercial real estate since the introduction of real estate investment trusts (REITs).Green and Wachter (2007) examined the institutional changes in housing finance in industrialized countries over a period of 30 years. They found that market-based system linked to capital markets was the most effective way to secure sustained finance compared to mortgage systems where cost and allocation of mortgages is decided by government. Tiwari (2001) cites the absence of risk-sharing in mortgage lending business in the form of secondary markets and mortgage insurance, as one of the important causes behind a constrained formal housing finance sector in India.

Walley et al. (2013) performed a regression analysis of the depth and penetration of the mortgage market with the funding sources of mortgage finance. They utilized dummy variables from Hofinet indicating primary and secondary source of funding for mortgage finance focusing on the extent to which the primary (or secondary) source of mortgage finance are utilized (i) retail funding through deposits, (ii) wholesale funding through financial markets, (iii) mortgage bonds, or (iv) other sources. Their results were that mortgage depth was higher in countries where the primary funding was mortgage bonds. There was also evidence of higher mortgage depth with retail funding but this became insignificant after they controlled for the secondary source of the funding. Wholesale funding through the financial markets was not associated with higher Mortgage Depth or Housing Loan Penetration.

Femi (2013) used Data Envelopment Analysis and Stochastic Frontier Analysis to analyze the efficiency of mortgage lenders in Nigeria. He argues that the existing funding sources are insufficient as the Nigerian capital market lacks breadth, especially in terms of the variety of securities available as investment choices. The study suggests the linking of the housing sector to the capital market through the securitization of loans originated by individual finance providers, thus creating mortgage backed securities.

Theory therefore tends to agree that the financing source for the mortgage lenders is important and if they rely on short-term deposits, then the mortgage market will be constrained. The following four sections of this literature review analyze the empirical literature on the influence of the various facets of the capital markets on the growth of the mortgage market.

In a cross-sectional study covering 99 countries, Walley et al. (2013) found that a larger and more

liquid stock market was associated with a deeper mortgage market. Using ratio of Stock Market Capitalization to GDP for the concerned counties, they found that countries with larger ratios also had deeper mortgage markets. The influence of equity market capitalization on mortgage market growth gives rise to hypothesis No 1 of this study.

Lea, et al. (2004) argues that insurance institutions have large pools of funds that can be accesses with the right mortgage securities for the purpose of financing housing. The creation of mortgage-related securities can provide instruments by which housing finance providers can access these important sources of funds and better manage and allocate part of their risks.

Utilizing the same data covering 99 counties, Walley et al. (2013) found that a larger insurance sector is associated with deeper mortgage markets. Using the major parameters of the performance of the insurance industry, namely, Percentage of Life Insurance Premiums to GDP, Percentage of Insurance Assets to GDP, they found that countries with larger ratios also had deeper mortgage markets. The depth of mortgage markets in this case was measured by the ratio of outstanding mortgage depth to GDP. The influence of the size of insurance assets on the growth of the mortgage market gives rise to hypothesis No 2 of this study.

Pension funds are institutional investors managing funds on behalf of members and paying the resulting returns and principal to them normally after retirement. Besides insurance companies, Lea, et al. (2004) argues that pension institutions also have large pools of funds that can be accessed with the right mortgage securities for the purpose of financing housing. Davis (1995) argues that pension funds to accumulate assets that can be invested in financial markets and with accumulating assets and the longer-term nature of their liabilities, pension funds have incentives to invest more in illiquid and long-term assets that yield higher returns, and thus provide a long-term supply of funds to the capital markets. Pension funds have an advantage over banks in that their debts are long term. Therefore, they have capacity to invest large scale funds for the long term.

The current study did not come across many studies on the influence of pension institutions on mortgage market growth. Walker and Lefort (2002) use panel data in examining the relationship between pension reform and capital markets. They find that increase in pension fund assets led to a decrease in the cost of capital. They however caution that some of their estimation results may suffer severely from measurement error problems, and their conclusions are preliminary and will need to be verified again when a longer period of observations becomes available. The influence of the pension funds on mortgage market growth gives rise to hypothesis No 3 of this study.

Utilizing the ratio of Bond Market Capitalization to GDP, Walley et al. (2013) examined the influence of the bond market on the depth of the mortgage market. They found a positive relationship between the public bond market and the depth of the mortgage market. The Private Bond Market Capitalization to GDP was however not positively correlated with mortgage market depth.

Warnock and Warnock (2008) postulated that in the emerging markets, a well developed government securities market can enable the growth of mortgage finance. To test this, they constructed a variable called Government Market which was the ratio of government securities outstanding to GDP. They found that the government securities market was not related to the depth of the housing finance system. They constructed a regression analysis to determine if countries with the smallest government securities markets also had the smallest mortgage markets but the results did not indicate so. They concluded that government securities markets do not provide an additional impetus to the development of the housing finance system above and beyond what is already provided by deep credit information systems, strong legal rights, and low inflation volatility. The influence of the bond market on the growth of the mortgage market gives rise to hypothesis No 4 of this study.

Hypothesis

Based on the above literature, this paper tests the following hypothesis:

1. H_0= There is no significant relationship between Ratio of Equity Market Capitalization to GDP and Mortgage Market Growth.
2. H_0= There is no significant relationship between Bond Market Turnover Ratio and Mortgage Market Growth.
3. H_0= There is no significant relationship between Pension Assets and Mortgage Market Growth.
4. H_0= There is no significant relationship between Ratio of Insurance Assets to GDP and Mortgage Market Growth.

Methodology

Multiple regression analysis was used on panel data for the 30 year period from 1984 to 2013. Regression analysis is only meaningful if the size of N is 30. The years 1984 to 2013 were considered as the data for the year 2014 could not be obtained from all the financial sector regulators in Kenya. The data was obtained from various sources among them, publications of the Insurance Regulatory Authority, Retirement Benefits Authority, various Capital Markets Authority publications and from the Nairobi Securities Exchange.

Model Specification

The data was subjected to a normality test before correlation and regression analysis because correlation and regression analysis are based on the assumption that the data is normally distributed. If the data is not normal, then the results of correlation and regression will be misleading. The Shapiro-Wilk test is most appropriate for small sample sizes of less than 50 observations. For this reason, the Shapiro-Wicks test was used in this study to assess normality. If the significance value of the Shapiro-Wilk test is greater than 0.05, the data is normal. If it is below 0.05, the data significantly deviate from a normal distribution (Shapiro and Wilks, 1965).

Correlation analysis was carried out to determine any association between the various independent variables and the dependent variable and hence the appropriateness of the variables to be included in the model. This is because if the variables are not related, then they are totally independent hence regression analysis is not necessary. Karl Pearson Moment correlation was used in conducting the correlation analysis because the data collected was parametric data. The Pearson Moment Correlation ranks between 0 to 1 with 0 denoting no relatedness and 1 denoting a perfect relationship. A score of less than 0.3 denotes a weak association, between 0.3 and 0.7 denotes medium correlation and above 0.7 means the variables are strongly correlated.

It was necessary to test for multicollinearity before the regression analysis. Coakes, Steed & Price (2008) argue that when the independent variables exhibit strong multicollinearity, then the regression model is deemed unreliable leading to problems when doing interpretation. In situations where the predictors are so similar, then it becomes difficult to know which one is actually causing the effect and one can easily conclude that they measure the same thing. According to Belsley (1991), a condition index greater than 15 indicates a problem of multicollinearity. A condition index larger than 100 indicate near dependencies that will make the regression coefficients unstable.

Due to the multicollinearity observed during the analysis above, stepwise regression was used in the analysis of the data. Stepwise regression is appropriate in this case as variables are added to the regression equation one at a time, using the statistical criterion of maximizing the R^2 of the included variables. After each variable is entered, each of the included variables is tested to see if the model would be better off it were excluded. The process of adding more variables stops when all of the available variables have been included or when it is not possible to make a statistically significant improvement in R^2 using any of the variables not yet included. Since variables will not be added to the regression equation unless they make a statistically significant addition to the analysis, all of the independent variable selected for inclusion will have a statistically significant relationship to the dependent variable.

According to Wichura (2006), the general regression equation when dealing with more than one independent variable is as follows:

$$Y= \beta+ \beta_1X_1 +\beta_2X_2+ \beta_3X_{3.....}$$

For the purpose of this study, borrowing from the model used by Aduda et al. (2013), the functional form of the regression model is given as;

$$Y = A + B_1X_1 + B_2X_2 +B_3X_3 + B_4X_4 + e.$$

Whereby:

Y = Outstanding Residential Mortgage Debt
A = Autonomous variable.
X_1 *= Ratio of Equity Market Capitalization to GDP*
X_2 *= Bond Market Turnover Ratio*
X_3 *= Ratio of Pension Assets to GDP*
X_4 = Ratio of Insurance Assets to GDP.
e = Stochastic variables.
B_1 = Coefficient of X1.
B_2 = Coefficient of X2.
B_3 = Coefficient of X3.
B_4 = Coefficient of X4.

The proxies for the development of the capital for this study include Equity Market Capitalization to GDP, the Bond Market Turnover Ratio; Pension Assets to GDP and Insurance Assets to GDP while Mortgage Market Growth is measured by the outstanding Residential Mortgage Debt. Cross-sectional studies like Walley et. Al., (2013) and Warnock and Warnock (2007) have used similar variables.

The Data

Data was collected on the total lending by the banking sector for real estate for the period under study from the annual Central Bank of Kenya bank supervision reports. For the period prior to the year 2000, the data was obtained from the statistical bulletins published by the Kenya National Bureau of Statistics. Data was also collected for Equity market capitalization as a percentage of the GDP, the Bond market turnover ratio, the pension assets, the insurance assets and the ratio of private credit to GDP. The data for the bond market was only

available for the years after 1997 when the bond market was established in Kenya. The data for the pension assets was only available as from the year 2001 when the legal framework governing the pension sector in Kenya was put in place. For the period prior to that, there was no agglomeration of pension assets in Kenya and therefore it was not possible to tell how large the pension assets were. Data for insurance assets was obtained from the Insurance Regulatory Authority and from the statistical bulletins published by the Kenya National Bureau of Statistics.

Findings and Discussions

Normality Test

The table below shows the Shapiro-Wilk test for the capital markets deepening variables of equity market capitalization to GDP, bond market turnover ratio, pension assets, insurance assets and ratio of private credit to GDP.

Tests of Normality for capital markets deepening data

	Shapiro-Wilk		
	Statistic	df	Sig.
Equity market capitalization to GDP	.878	30	.533
Bond Market Turnover Ratio	.543	30	.402
Pension Assets to GDP	.652	30	.090
Insurance Assets	.815	30	.132
Ratio of Private Credit to GDP	.887	30	.164

As shown from the analysis above, the significance level is greater than 0.05 and therefore the capital markets deepening variables involved in the study were normally distributed.

Correlation Test

The table below shows the correlation of the various capital markets deepening variables and mortgage loans.

Table 4.8: Correlations for Capital Markets Deepening Variables

	Mortgage loans	Equity market capitalization to GDP	Bond Market Turnover	Pension Assets	Insurance Assets	Ratio of Private Credit to GDP
Mortgage Loans	1.000	.810	-.032	.709	.981	.930
Equity market capitalization to GDP	.810	1.000	-.074	.720	.839	.728
Bond Market Turnover Ratio	-.032	-.074	1.000	-.376	-.019	-.031
Pension Assets	.709	.720	-.376	1.000	.751	.728
Insurance Assets	.981	.839	-.019	.751	1.000	.930
Ratio of Private Credit to GDP	.930	.728	-.031	.728	.930	1.000

The table above shows a strong correlation between equity market capitalization to GDP, pension assets to GDP, insurance assets and ratio of private credit to GDP with mortgage loans. There is a weak negative correlation between bond market turnover and mortgage loans. Insurance assets have the highest association with mortgage loans followed by ratio of private credit to GDP and equity market capitalization to GDP in that order.

Multicollinearity test

The table below shows the collinearity diagnostics for the capital markets deepening variables of equity market capitalization to GDP, bond market turnover ratio, pension assets, insurance assets and ratio of private credit to GDP.

Collinearity Diagnostics.

Dimension	Eigenvalue	Condition Index	Variance Proportions					
			(Constant)	Equity market capitalization to GDP	Bond Market Turnover Ratio	Pension Assets (000,000)	Insurance Assets (000,000)	Ratio of Private Credit to GDP
1	4.863	1.000	.00	.01	.01	.00	.00	.00
2	.717	2.605	.00	.01	.31	.00	.00	.00
3	.238	4.522	.01	.02	.39	.00	.01	.00
4	.164	5.445	.00	.71	.02	.01	.00	.00
5	.017	17.040	.00	.12	.26	.61	.14	.04
6	.002	54.917	.99	.14	.02	.37	.85	.96

As can be observed from the table above that two of the capital markets deepening variables; ratio of private credit to GDP and insurance assets exhibited multicollinearity as the condition index was more than 15. Due to the multicollinearity, stepwise regression was used in the subsequent analysis.

Stepwise Regression

Model Fitness

The model summary for the capital markets deepening factors is shown below:

Model Fitness for Capital markets deepening factors

R Square	Adjusted R Square	Std. Error of the Estimate
.953	.948	11294.509

This indicates that 94.8% of the variation in mortgage loans around its mean $\bar{Y}$ can to a large extent be explained by the regressor variables; pension assets, equity market capitalization to GDP and insurance assets. Excluded from the analysis were the variables bond market turnover and ratio of private credit to GDP.

Model Output

The output of shown in the table below indicates that equity market capitalization to GDP has a negative influence on mortgage growth while pension assets and insurance assets have a positive influence on mortgage growth.

Table 4.11: Model Output

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	-13241.621	5035.982		-2.629	.014
	Pension Assets	.168	.046	.511	3.656	.001
	Equity market capitalization to GDP	-867.919	194.420	-.264	-4.464	.000
	Insurance Assets	.330	.081	.627	4.082	.000

The regressor variables were pension assets, equity market capitalization to GDP and insurance assets. Stepwise regression excluded from the analysis the variables bond market turnover and ratio of private credit to GDP. Analyzing the impact on mortgage loans of each independent variable, both in direction and magnitude, a unit increase in pension assets causes a 0.168 increase in mortgage loans while a unit increase in equity market capitalization to GDP causes a decrease of 867.919 of mortgage loans. A unit increase in insurance assets causes a 0.33 increase in mortgage loans.

The t-statistic for each explanatory variable (i.e., the coefficient divided by the standard error) is reported in the table above. The t-statistics for all the regressor variables are greater than 2.462 suggesting that pension assets, equity market capitalization to GDP and insurance assets are significant at the 1% level in explaining mortgage loans. At 5% level of significance, a t-statistics greater than 1.699 suggests the regressors that are significant in explaining mortgage loans. In this case, all the regressor variables are significant. At 10% significance level, all t-statistics are greater than 1.311meaning the regressors are significant at the 10% level in explaining mortgage loans while national savings rate and exchange rates are statistically insignificant.

Therefore, the null hypotheses of no significant influence of pension assets, equity market capitalization to GDP and insurance assets on mortgage growth are rejected and the alternative hypotheses accepted. In conclusion, insurance assets and pension assets have the highest positive influence on mortgage growth in Kenya while equity market capitalization to GDP has the highest negative influence.

Conclusions

Analysis of the influence of capital markets deepening on mortgage growth shows that insurance assets and pension assets have the highest positive influence on mortgage growth in Kenya while equity market capitalization to GDP has the highest negative influence. The results of this research tend to agree with previous work on the same area like Walley et al. (2013),Lea, et al. (2004), Dinsmore (1998), and Femi (2013)among others that the development of the mortgage market goes hand in hand with the development of the segments of the capital markets responsible for the mobilization of long term finance. However, this research also brings out the fact that independently, only the insurance industry seems to be the driver of the growth of the mortgage market.

Because insurance firms and pension firms hold large amounts of long term funds, these funds are useful in financing long term real estate projects. Walley et al. (2013) found that a larger figure of insurance assets was associated with a larger mortgage market while Vittas (1999) also argue that growth of the insurance sector will have a beneficial influence on the financial markets generally and the mortgage market specifically.

The significant relationship between ratio of equity market capitalization to GDP and mortgage market growth differs with the work of Walley et al., (2013) on the direction of the relationship. Walley et al., (2013) through correlation analysis across different countries found that a large ratio of stock market capitalization to GDP was associated with a larger mortgage market. However, the panel data analyzed in Kenya shows that the direction of the relationship is negative.

The findings of this study are significant to policy makers for the mortgage market and the capital markets in that the various segments of capital markets will only significantly impact on the mortgage market jointly, otherwise only the insurance industry and the equity market capitalization influences the mortgage market independently.

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